

WE CLAIM:

1. An optical isolator device for use in a predetermined temperature range, comprising:

an isolator arrangement of at least a first birefringent crystal, a non-reciprocal element and a second birefringent crystal,

a mount having a first mounting surface provided with a first protruding contact region;

at least one of the first birefringent crystal, the non-reciprocal element and the second birefringent crystal having a second mounting surface contacting the protruding contact region; and

adhesive attachingly disposed between portions of the first and second mounting surfaces not in mutual contact.

2. A device as recited in claim 1, wherein at least a second one of the first birefringent crystal, the non-reciprocal element and the second birefringent crystal has a third mounting surface contacting a second protruding region of a fourth mounting surface of the mount, with adhesive attachingly disposed between the third mounting surface and the mount.

3. A device as recited in claim 2, wherein a third one of the first birefringent crystal, the non-reciprocal element and the second birefringent crystal has a fifth mounting surface contacting a third protruding region of a sixth mounting surface of the mount, with adhesive attachingly disposed between the fifth mounting surface and the mount.

4. A device as recited in claim 2, wherein one side of the mount is provided with at least two raised members, protruding regions on ends of the at least two raised members forming the second protruding region, and the at least one of the first birefringent crystal, the non-reciprocal element and the

second birefringent crystal comprising the non-reciprocal element mounted to the mount in a region between the at least two raised members.

5. A device as recited in claim 4, wherein two of the at least two raised members are arranged to permit the non-reciprocal element to be translated between the two of the at least two raised members and mounted over a through aperture in the mount.

6. A device as recited in claim 1, the adhesive remains under tension for temperatures within the predetermined temperature range.

7. A device as recited in claim 1, wherein the predetermined temperature range lies within the range -20 °C to 75 °C.

8. A device as recited in claim 1, wherein the protruding contact region is disposed at least partially around a light transmission aperture of the mount to define the mounting plane.

9. A device as recited in claim 1, wherein the protruding contact tip region includes at least three individual contact tips on the mounting surface to define a mounting plane.

10. A device as recited in claim 1, wherein the adhesive is a thermally cured epoxy.

11. A device as recited in claim 1, wherein the adhesive has a thermal expansion coefficient higher than a thermal expansion coefficient of the mount and than a thermal expansion coefficient of the at least the first birefringent crystal, the non-reciprocal element and the second birefringent crystal.

12. A device as recited in claim 1, wherein the mounting surface further includes a well proximate the protruding contact tip region.

13. A device as recited in claim 1, wherein the isolator arrangement is disposed in a collimated light beam path between first and second collimator units.

14. A device as recited in claim 13, wherein the first and second collimator units are single fiber collimator units.

15. A device as recited in claim 13, wherein the first collimator unit is a dual fiber collimator unit and the second collimator unit is a single fiber collimator unit.

16. A device as recited in claim 15, further comprising a filter disposed between the dual fiber collimator unit and the single fiber collimator unit, the isolator arrangement being disposed between the filter and the single fiber collimator unit.

17. An optical system, comprising:
an optical transmitter producing output light;
an optical receiver receiving at least a portion of the output light;
and
an optical fiber link coupling between the optical transmitter and the optical receiver, the optical fiber link including a fiber isolator device having
an isolator arrangement of at least a first birefringent crystal, a non-reciprocal element and a second birefringent crystal forming an isolator unit,
a mount having a first mounting surface provided with a first protruding contact region;
at least one of the first birefringent crystal, the non-reciprocal element and the second birefringent crystal having a

second mounting surface contacting the protruding contact region; and

adhesive attachingly disposed between portions of the first and second mounting surfaces not in mutual contact.

18. A system as recited in claim 17, wherein the fiber isolator device includes two fiber collimator units, the isolator arrangement being disposed between the two collimator units, and further comprising a filter disposed between the two collimator units.

19. A system as recited in claim 17, further comprising one or more optical amplifier units disposed on the optical fiber link between the optical transmitter and the optical receiver.

20. A system as recited in claim 17, wherein the optical transmitter includes modulated light sources operating at different wavelengths and optical combining elements to combine outputs from the modulated light sources into a fiber output coupled to the optical fiber link.

21. A system as recited in claim 17, wherein the optical receiver includes optical separating elements to separate different wavelengths of light received from the optical fiber link and to direct light at different wavelengths to respective detectors.

22. A system as recited in claim 17, further comprising an optical add/drop multiplexer disposed on the optical fiber link.

23. A method of mounting optical elements to a mount in an optical isolator for use in a predetermined temperature range, the mount having a first protruding contact region on a mounting surface, and the isolator having an

isolator arrangement that includes at least a first birefringent crystal, a non-reciprocal element and a second birefringent crystal, the method comprising:

providing adhesive between at least one of the first birefringent crystal, the non-reciprocal element and the second birefringent crystal;

pressing the at least one of the first birefringent crystal, the non-reciprocal element and the second birefringent crystal into contact with the first protruding contact region thereby substantially expelling the adhesive from between the at least one of the first birefringent crystal, the non-reciprocal element and the second birefringent crystal and the first protruding contact region; and

curing the adhesive at a temperature exceeding the predetermined temperature range.

24. A method as recited in claim 23, further comprising pressing a second of the first birefringent crystal, the non-reciprocal element and the second birefringent crystal against a second protruding contact region of the mount to expel adhesive from between the second of the first birefringent crystal, the non-reciprocal element and the second birefringent crystal and the second protruding contact region.

25. A method as recited in claim 24, further comprising pressing a third of the first birefringent crystal, the non-reciprocal element and the second birefringent crystal against a third protruding contact region of the mount to expel adhesive from between the third of the first birefringent crystal, the non-reciprocal element and the second birefringent crystal and the third protruding contact region.

26. A method as recited in claim 23, wherein providing the mount with a protruding contact region includes providing the protruding contact region as at least part of a ring around a light transmission aperture of the mount.

27. A method as recited in claim 23, wherein providing the mount with a protruding contact region includes providing at least three individual contact tips on the mounting surface to define a mounting plane.

28. A method as recited in claim 23, wherein providing the adhesive includes providing a thermally curing epoxy between the at least one of the first birefringent crystal, the non-reciprocal element and the second birefringent crystal and the mount.

29. A method as recited in claim 23, further comprising curing the adhesive between the mounting surface and the at least one of the first birefringent crystal, the non-reciprocal element and the second birefringent crystal optical element while the protruding contact region contacts the at least one of the first birefringent crystal, the non-reciprocal element and the second birefringent crystal.

30. A method as recited in claim 23, wherein, after curing, the adhesive remains under tension for temperatures within the predetermined temperature range.

31. A method as recited in claim 23, wherein providing the adhesive includes providing thixotropic adhesive.

32. A method as recited in claim 23, further comprising translating the non-reciprocal element in a direction perpendicular to an axis of the mount, between two raised members, and adhering the non-reciprocal mount over a light aperture of the mount.